

EQUIPMENT INSTALLATION**CHAPTER 14**

TYPES

Equipment installation includes unloading, moving into location, uncrating, cleaning,

assembling, positioning, aligning, supporting, and anchoring if required.

UNLOADING

The task of unloading and moving includes lifting or skidding from the truck, transporting with equipment, or rolling or skidding into approximate position. The typical crew for this work is one crew

leader and two to five workers, depending on the weight and size of the equipment. Mechanical lifting equipment is normally used to unload and move the heavier pieces.

CLEANING AND ASSEMBLING

The task of cleaning and assembling includes uncrating, removing protective paper and coating, removing grease and oils, removing rust, assembling and attaching any

parts shipped loose, and flushing oil reservoirs and filling with the proper lubricant. The typical crew for this work is one crew leader and one to four workers.

POSITIONING AND ALIGNING

The task of positioning and aligning includes moving into position, bringing to grade, leveling, aligning, and connecting

drives. The typical crew for this work is one crew leader and two to four workers.

SUPPORTING AND ANCHORING

The task of supporting and anchoring includes installing shims and plates; grouting, drilling for expansion shields; installing expansion shields; drilling and tapping base-

plates; and installing bolts, washers, and nuts. The typical crew for this work is one crew leader and two to four workers.

CONNECTING EQUIPMENT

The task of connecting equipment includes initial wiring, piping, or duct connection. It does not include installing breakers,

switches, controls, dampers, or valves. The typical crew for this work is one crew leader and one to four workers.

ESTIMATING TABLES

Tables 14-1 through 14-8, pages 14-2 through 14-8, may be used in preparing detailed man-hour estimates for equipment installation. The tables do not include provi-

sions for loading and hauling equipment to the jobsite or for piping, wiring, or duct-work other than the initial connection to the equipment.

Table 14-1. Installation of air compressors and pumps

Work element description	Unit	Man-hours/unit	Crew Size
Electric-driven compressor tank unit:			
5 to 20 cu ft per min	1	10	2
25 to 50 cu ft per min	1	12	2
Motor and compressor set (reservoir tank not included):			
75 to 250 cu ft per min	1	16	2 - 3
275 to 500 cu ft per min	1	30	3 - 4 ¹
550 to 750 cu ft per min	1	50	4 - 6 ¹
Motor and pump set (reservoir tank not included):			
50 to 200 gal per min	1	12	2
250 to 750 gal per min	1	20	2 - 3 ¹
800 to 1,250 gal per min	1	30	3 - 5 ¹
¹ Need forklift truck when working inside a building. Add 20 percent to man-hours if fuel-burning engines are used. Compressor pressures are 100 - 250 psi.			

Table 14-2. Installation of air-conditioning equipment

Work element description	Unit	Man-hours/unit	Crew Size
Window air-conditioning units:			
1/2- to 3/4-ton	1	5	1 - 2
1- to 1 1/2-ton	1	7	1 - 2
2- to 2 1/2-ton	1	9	1 - 2
Self-contained, water-cooled air-conditioning units:			
3- to 5-ton	1	42	2 - 4
5- to 8-ton	1	55	2 - 4
10- to 15-ton	1	80	3 - 5
Central air-conditioning equipment:			
3- to 5-ton	1	40	3 - 4
5- to 8-ton	1	70	3 - 5
10- to 15-ton	1	90	4 - 6
15- to 25-ton	1	200	4 - 6
25- to 50-ton	1	300	4 - 6
50- to 75-ton	1	600	5 - 10
75- to 100-ton	1	1,000	5 - 12
NOTE: Installation does not include piping and wiring to and between equipment.			

Table 14-3. Installation of electric motors and exhaust fans

Work element description	Unit	Man-hours/unit	Crew Size
Electric motors with switches:			
1- to 5-hp	1	3	1
5- to 15-hp	1	5	1 - 2
15- to 30-hp	1	16	2 - 3 ¹
30- to 100-hp	1	48	2 - 3 ¹
Exhaust fans:			
12- to 24-in	1	2	1
26- to 42-in	1	6	1 - 2
48- to 60-in	1	6	2 - 3 ¹
Louvers for exhaust fans:			
12- to 24-in	1	10	1 - 2
26- to 42-in	1	16	2 - 3 ²
48- to 60-in	1	20	2 - 3 ²
Power ventilators:			
6- to 20-in	1	8	1 - 2
24- to 42-in	1	21	2 - 3
¹ Need forklift truck to move if working inside a building. Same truck or hoist is used to position and align.			
² May need scaffolding if high on wall.			
NOTE: Man-hours for louvers include fabricating and setting at site.			

Table 14-4. Installation of heating boilers and expansion tanks

Work element description	Unit	Man-hours/unit	Crew Size
Steam boilers:			
50,000- to 95,000-BTU	1	14	2 - 3
100,000- to 250,000-BTU	1	22	2 - 3
260,000- to 450,000-BTU	1	38	4 - 6
500,000- to 750,000-BTU	1	55	4 - 6
800,000- to 1,000,000-BTU	1	85	4 - 6
1,050,000- to 1,500,000-BTU	1	135	4 - 6
Hot-water boilers:			
50,000- to 95,000-BTU	1	16	2 - 3
100,000- to 250,000-BTU	1	38	2 - 3
260,000- to 450,000-BTU	1	52	4 - 6
500,000- to 750,000-BTU	1	85	4 - 6
800,000- to 1,000,000-BTU	1	115	4 - 6
1,050,000- to 1,500,000-BTU	1	175	4 - 6
Expansion tanks:			
20- to 50-gallon	1	6	2
55- to 100-gallon	1	10	2 - 3
Fuel oil storage tanks above grade:	See Table 14-8, page 14-8		
NOTES:			
1. BTU = British thermal units.			
2. Piping and wiring not included. Boilers are iron-sectional with insulating jackets and safety devices. Subtract 20 percent for steel-packaged boilers.			

Table 14-5. Installation of hot-water storage heaters

Work element description	Unit	Man-hours/unit	Crew size
Hot-water storage heaters:			
50- to 75-gal	1	10	2
80- to 150-gal	1	16	2 - 3
155- to 300-gal	1	36	3 - 6 ¹
¹ Needs forklift truck or else additional men to move and position.			
NOTE: Piping and wiring not included.			

Table 14-6. Installation of carpentry and general shop equipment

Work element description	Unit	Man-hours/unit	Crew Size
Carpentry equipment:			
Bandsaw, 18-in	1	10	2 - 3
Bandsaw, 28-in	1	14	2 - 3
Table saw, 16-in	1	18	2 - 3
Cut-off saw, 18-in	1	16	2 - 3
Disk sander, 18-in	1	10	2 - 3
Jointer, 12-in	1	8	2 - 3
Lathe, 60-in	1	24	4 - 5
Planer, 24- by 8-in	1	30	3 - 4
Shaper, 4-in vertical lift	1	6	2 - 3
General shop equipment:			
Bench grinder	1	2	1
Pedestal grinder	1	8	2
Drill press, 1/2- to 1-in ¹	1	4	2 - 3
Drill press, 1 1/2- to 2 1/2-in ¹	1	8	2 - 3
Power hacksaw, 16-in	1	26	3 - 4
Pipe threader, 1/2- to 4-in	1	8	2 - 3
¹ Light work equipment for wood.			
NOTE: A forklift or hand truck is needed to move any of the above equipment.			

Table 14-7. Installation of machine- and metal-shop equipment

Work element description	Unit	Man-hours/unit	Crew Size
Machine-shop equipment:			
Hydraulic bender	1	15	2 - 4
Hydraulic press, 100-ton	1	12	2 - 3 ³
Hydraulic press, 400-ton	1	18 ¹	3 - 4 ³
Lathe, 13- by 78-in	1	35	2 - 4 ³
Lathe, 25- by 144-in	1	70	5 - 7 ²
Milling machine	1	50	4 - 6 ³
Planer	1	42	3 - 4
Shaper, 24-in	1	20	3 - 4
Drill press, 4-ft arm, 2-in chuck	1	48	4 - 6 ²
Metal-shop equipment:			
Brake, 60-in, 18-gage	1	18 ¹	3 - 4 ³
Brake, 96-in, 14-gage	1	32 ¹	5 - 7 ³
Brake, 120-in, 11-gage	1	40 ¹	5 - 7 ³
No. 1/2 universal iron worker	1	38	2 - 4 ³
Shear, 96-in, 18-gage	1	25 ¹	4 - 6 ³
Shear, 96-in, 11-gage	1	28 ¹	4 - 6 ³
Bandsaw, 26-in	1	18	2 - 3 ³
Roll, 48-in	1	8	2 - 3
¹ Does not include construction of special bases.			
² Item must be moved on rollers to prevent twisting.			
³ Requires one or two forklifts to move.			

Table 14-8. Installation of warm-air furnaces

Work element description	Unit	Man-hours/unit	Crew size
Warm-air furnaces:			
50,000- to 100,000-BTU/hr	1	22	2 - 3
100,000- to 150,000-BTU/hr	1	34	2 - 3
150,000- to 300,000-BTU/hr	1	52	2 - 4
300,000- to 600,000-BTU/hr	1	75	2 - 4
600,000- to 1,000,000-BTU/hr	1	120	3 - 5
1,000,000 - 2,000,000-BTU/hr	1	150	3 - 5
Fuel oil storage tanks (manufactured):			
200- to 500-gal	1	10	2 - 3
1,000- to 2,000-gal	1	20	3 - 4
3,000- to 5,000-gal	1	40	4 - 6
NOTE: Furnaces are complete with fans, filters, safety controls, and oil burners. Does not include ducts.			